THURSDAY, JANUARY 2, 1908.

THE INHERITANCE OF "ACQUIRED" CHARACTERS.

Sur la Transmissibilité de Charactères acquis. By Eugenio Rignano. Pp. 320. (Paris: F. Alcan, 1906.) Price 5 francs.

A MAN of science to command general attention and interest must do two things; first, he must make interesting discoveries or profound generalisations; and, secondly, he must do these things at the right time. Darwin made his name because he fulfilled both these conditions. Mendel died an unknown man because he did not fulfil the second. He was forty years too soon. Supposing that Mendel's paper *had* been completely lost sight of, as it actually was for thirty-five years, and very nearly was altogether, his results must, sooner or later, have been obtained by somebody else, who would then have won the laurels which now belong to Mendel, not because he made a greater discovery than Mendel, but because he made it at a time when the state of biological thought was such that it could appreciate the significance of the discovery.

If it is possibly fatal to make discoveries too soon, it is certainly fatal to make them too late. It is therefore with a certain sense of weariness, mingled with surprise, that we note the appearance of a work on the transmission of acquired characters Lamarck's theory of evolution involved a belief in the thesis that acquired characters are transmitted. Darwin believed that evolution was due to the natural selection of both innate and acquired characters, and his theory of pangenesis was more than anything else an attempt (shirked by Lamarck) to provide a hypothesis to account for the transmission of acquirements. Darwin's suggestion that innate characters played a part in evolution as well as acquired ones paved the way for the great step taken by Weismann, who in his theory of the continuity of the germ-plasm laid the foundation of the modern, and still infant, science of heredity by doing away with the transmission of acquirements once and for all.

The step taken by Weismann is far and away the most important in the history of evolution, or at any rate of genetics, because it divides that history into two periods, in the first of which the problem to be solved was: "How do the characters of an organism get into the germ-cell which it produces?" whilst in the second the problem has become: "How are the characters of an organism represented in the germ-cell which produces it?"

Weismann showed that the problem of the first period was as unreal as the question about the apple dumpling which puzzled one of the Georges, by opening our eyes to the fact that the characters of an organism do not get into its germ-cells any more than the apple gets into its crust, but that both the germ-cells and the apple were there all the time.

Darwin, although he made a great step in advance of Lamarck by elaborating a theory of evolution which did not rest solely or even largely on the transmission of acquirements, did not go to the length of throwing that theory overboard altogether. It was left for Weismann to do this and thereby rid biology of a belief which has been the occasion of more futile discussion than any other that can be named. The full significance of Weismann's action is seldom appreciated, and cannot be done justice to here, but it is not too much to say that without it the problem of heredity would have been doomed to insolubility, and, to take a concrete example, that the Mendelian work of the last seven years would have been impossible.

Whether it is due to the general truth that a view once widely held is difficult to stamp out, or whether it is that there is something peculiarly fascinating in the belief that acquired characters are transmitted, the fact remains that there are still to be found isolated biologists and whole hosts of medical men who still hold it. However, as a belief in telegony, though rare, still exists, we perhaps ought not to be surprised at anything.

The author of the book before us, who is an engineer interested in sociology, believes in the transmission of acquirements, and has invented a theory of centro-epigenesis to account for the phenomenon. If the book is read it must be read in conjunction with the appendix dealing with this topic in Mr. Archdall Reid's "Principles of Heredity," and with Weismann's "Deszendenztheorie," which has been translated into English by Prof. J. Arthur Thomson.

A. D. D.

PROBLEMS OF VISION.

Zur vergleichenden Physiologie des Gesichtssinnes. By Prof. E. Raehlmann. Pp. iv+58. (Jena: G. Fischer.) Price 1.50 marks.

THIS short pamphlet contains a discussion of three interesting problems in vision. It has long been known that the arrangement of the retinal elements in regard to the light falling upon the eye is reversed in the vertebrata and some invertebrates as compared with the majority of the latter. The author wishes to direct attention to the problem of explaining how in these "inverted eyes" the stimulus of light affects the retina. He puts forward the view that the morphologically outer end of the rods and cones acts in these cases as a reflector, and causes the light to re-enter the inner limb where the visual stimulus commences. In that sense, therefore, the vertebrate retina is no exception to the general statement that the rods always face the effective light rays. The isolation of the rods by pigment leads the author to an interesting account of the various forms of iris and of retinal pigments.

The second problem is the function of the tapetum. The significance of this brilliant structure has received little attention. Hatschek has attempted to show that it reinforces the incident light. The author, however, proceeds to show that the incident light is not effective even partially, but that it is the rays reflected from the concave and asymmetrical tapetal mirror which illuminate the inner portion of the peripheral retina. This area, weak in perception of detail, but

strong in detection of movement, catches the images of objects moving laterally. The tapetum would thus be put out of action by "blinkers," and, on the other hand, would aid carnivores both by detecting movements of their prey and by bringing these movements to the analysis of the central vision.

The third problem discussed in this pamphlet is that of colour-vision amongst insects. Insects are chosen because there seem good *a priori* grounds for believing that they possess colour-perception. The problem is raised in this form: Is any morphological peculiarity in the structure of these presumably colour-perceptive animals associated with this faculty, and can we picture their colour-field? The author points out the well-known composite nature of the rhabdoms or rods in the higher crustacea and insects, how they are composed of denser and more refractive plates alternating with feebly refracting layers, and how white light becomes broken up, partially absorbed and partially resolved into interference colours. He concludes that diurnal insects must view objects as we should see them through a tinted glass. Those coloured with the like tint would stand out from the rest, the majority would be blurred, and the whole field would be dim in any but a strong light. Hence, the author infers, the activity of diurnal lepidoptera only in very bright weather. Some of the suggestions made in this speculative essay are of great interest. Allied species often exhibit very different choice of stations, and comparison of their eyes may throw some light on why they do so. Again, the form of the rods of diurnal insects is certainly broadly different from that of nocturnal insects; the former are clear, the latter suffused with red pigment. But, on the other hand, both kinds of insect-eye show a similar lamellar structure, and it would require a far more rigid demonstration than is given by the author of this work before we could accept the view he takes, fascinating and suggestive as it is.

A LANCASHIRE FLORA.

The Flora of West Lancashire. By J. A. Wheldon and A. A. Wilson. Pp. iii+511. (Liverpool: J. A. Wheldon, 60 Hornby Road, Walton; Ilkley: A. Wilson, 4 Eaton Road, 1907.) Price 12*s.* 6*d.*

WHEN the ravages of the jerry-builder are fast obliterating the comparative solitudes on the outskirts of our great cities, and the equally destructive, though more localised, irruptions caused by dock and railway extensions and industrial enterprises are slowly exterminating the flora of our country-sides, it is a matter for congratulation that there are to be found men like the authors of this flora, prepared to sacrifice hours of leisure and recreation in the task of cataloguing for future reference the plant inhabitants of such botanically doomed districts. As the authors point out, Lancashire is sadly deficient in such records, and the present result of their painstaking efforts is to be welcomed for that reason, if for no other.

The volume is, in the main, a catalogue of the plants of the district known in Watson's "Topographical Botany" as "Vice-County No. 60," embracing the West Lancashire spurs of the Pennines, the coast district between Carnforth, Morecambe and Lancaster, and the extensive flat lands reaching from the estuary of the Lune to that of the Ribble. The catalogue is prefaced by a summary of the general topographical and botanical features of the district, by a chapter on meteorology and climate, and a brief synopsis of the relation of plant distribution to latitude and to edaphic factors. The flora follows, as the authors say in their preface, "the conventional models," yet one could have wished that they had departed from these models—at least in a few fundamental particulars.

One of the most remarkable features of recent British floras is the inclusion of gymnosperms under the head of dicotyledons. It is incomprehensible to the general botanist that a taxonomy so archaic should be repeated so persistently in successive editions of the London catalogue, in local floras like the present, and even in the latest list of British plants compiled by Britten and Rendle.

Again, the value of this flora would have been greatly enhanced had the authors deemed it advisable to add some critical notes on local forms and varieties special to the district, on the model of Townsend's excellent flora of Hampshire.

Although they do not profess to give "a botanical survey" of the West Lancashire area, the authors have devoted nearly a quarter of the volume to what is to all intents and purposes a digest of that aspect of their subject—to the general reader by far the most interesting part of the book. Moreover, this section is illustrated by fifteen most excellent photographs of characteristic ecological features. One does not wish to depreciate the value of records of "first finds," nor the claim to recognition of the "first finders," but there remains a lingering desire for a more succinct treatment of such records—which, after all, can be only of local interest—and a fuller statement of the main general topographical features, a statement which the authors are, apparently, so well qualified to give.

It has been customary, for some unexplained reason, to include in local (and even general British) floras only dicotyledons (including—saving the mark! Coniferæ), monocotyledons, Pteridophyta and Characeæ. Messrs. Wheldon and Wilson have had the courage to include mosses, Hepaticæ and lichens, on which groups, if we mistake not, one at least of the writers is an acknowledged authority. It is unfortunate that they have not been able to enlist the aid of a fungologist and algologist, and so present us with a *complete* flora of the area.

It seems almost ungracious to direct attention to the many typographical errors, especially in the first quarter of the volume (over and above the few errata mentioned), and, too, the haphazard distribution of commas and full stops, authorities for species, and so on, but these criticisms are made with no intention of depreciating the merits of the work under review, but rather of indicating what we think are deficiencies and blemishes on what is otherwise a valuable contribution to the field botany of a hitherto neglected district.